REMARKS

This application has been carefully reviewed in light of the Office Action dated April 3, 2006. Claims 1 to 16 have been cancelled herein, without prejudice or disclaimer of subject matter. Claims 17 to 33 have been added, of which claims 17, 26, 29, and 31 to 33 are the independent claims. Reconsideration and further examination are respectfully requested.

Applicant submits that since support for the substance of the new claims is found throughout the disclosure, including at least Figures 1 to 11, no new matter has been added.

The title, which was objected to in the Office Action, has been amended in accordance with the Examiner's instruction. Withdrawal of the objection to the title and further examination are respectfully requested.

In the Office Action, claims 10 to 13 were objected to for various informalities; claims 1, 4, 8 and 13 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,934,115 ("Lampel"); claims 2, 6, 8, 14, and 16 were rejected under 35 U.S.C. § 103(a) over Lampel in view of 6,081,490 ("Kuroda"); claims 3, 5, 7, 8, 15 and 16 were rejected under 35 U.S.C. § 103(a) over Lampel in view of Kuroda, and further in view of U.S. Patent No. 6,104,682 ("Konishi"); and claim 9 was rejected under 35 U.S.C. § 103(a) over Lampel in view of U.S. Patent No. 6,369,624 ("Wang"). As indicated above, claims 1 to 16 have been cancelled herein, without prejudice or disclaimer of subject matter, and without conceding the correctness of the associated objections and rejections. The objection and the § 102 and § 103 rejections are therefore considered to be moot. Further examination is therefore respectfully requested.

According to one general implementation, the present disclosure generally relates to signal output. A 180-degree shifted signal is output from a 180-degree phase shifting circuit, the 180-degree shifted signal being phase-shifted from an input signal by an odd multiple of 180 degrees, and the input signal is input to a first input terminal of an operational amplifier. The 180-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a different polarity, and a difference between the input signal and the 180-degree shifted signal is output from an output terminal of the operational amplifier.

Referring to particular claim language, independent claim 17 recites a signal output circuit including a 180-degree phase shifting circuit for shifting a phase of an input signal by an odd multiple of 180 degrees, and a first operational amplifier having first and second input terminals and an output terminal, the first and second input terminals having a different polarity. The input signal is input into the first input terminals, where a 180-degree shifted signal output from the 180-degree phase shifting circuit is input to the second input terminal. A difference between the input signal and the 180-degree shifted signal is output from the output terminal.

Independent claim 31 recites a signal output method including outputting a 180-degree shifted signal from a 180-degree phase shifting circuit, the 180-degree shifted signal being phase-shifted from an input signal by an odd multiple of 180 degrees, and inputting the input signal to a first input terminal of an operational amplifier. The method also includes inputting the 180-degree shifted signal to a second input terminal of the operational amplifier, the first and second input terminals having a different polarity, and outputting a difference between the input signal and the 180-degree shifted signal from an output terminal of the operational amplifier.

The applied art is not seen to disclose, teach, or to suggest the foregoing features recited by independent claims 17 and 31. In particular, Lampel is not seen to disclose at least the features that *i)* the input signal is input to a first input terminal of an operational amplifier, *ii)* the 180-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a different polarity, and *iii)* a difference between the input signal and the 180-degree shifted signal is output from an output terminal of the operational amplifier.

According to another general implementation, the present disclosure generally relates to signal output. A 360-degree shifted signal is output from a 360-degree phase shifting circuit, the 360-degree shifted signal being phase-shifted from an input signal by an integral multiple of 360 degrees, and the input signal is input to a first input terminal of an operational amplifier. The 360-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity, and a sum of the input signal and the 360-degree shifted signal is output from an output terminal of the operational amplifier.

Independent claim 26 recites a signal output circuit including a 360-degree phase shifting circuit for shifting a phase of an input signal by an integral multiple of 360 degrees, and a first operational amplifier having a first and second input terminals and an output terminal, the first and second input terminals having a same polarity. The input signal is input to the first input terminal, and a 360-degree shifted signal output from the 360-degree phase shifting circuit is input to the second input terminal. A sum of the input signal and the 360-degree shifted signal is output from the output terminal.

Independent claim 32 recites a signal output method including outputting a 360-degree shifted signal from a 360-degree phase shifting circuit, the 360-degree shifted signal being phase-shifted from an input signal by an integral multiple of 360 degrees, and inputting the input signal to a first input terminal of an operational amplifier. The method also includes inputting the 360-degree shifted signal to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity, and outputting a sum of the input signal and the 360-degree shifted signal from an output terminal of the operational amplifier.

The applied art is not seen to disclose, teach, or to suggest the foregoing features recited by independent claims 26 and 32. In particular, Lampel is not seen to disclose at least the features that *iv)* the input signal is input to a first input terminal of an operational amplifier, *v)* the 360-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity, and *vi)* a sum of the input signal and the 360-degree shifted signal is output from an output terminal of the operational amplifier.

According to another general implementation, the present disclosure relates to signal output. A 180-degree shifted signal is output from a 180-degree phase shifting circuit, the 180-degree shifted signal being phase-shifted from an input signal by an odd multiple of 180 degrees, and a 360-degree shifted signal is output from a 360-degree phase shifting circuit, the 360-degree shifted signal being phase-shifted from the input signal by an integral multiple of 360 degrees. The input signal is input to a first input terminal of an operational amplifier, and the 360-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity. The 180-degree shifted signal is input to a third input

terminal of the operational amplifier, the third input having a different polarity than the first and second input terminals. A difference of a sum of the input signal and the 360-degree shifted signal from the 180-degree shifted signal is output from an output terminal of the operational amplifier.

Independent claim 29 recites a signal output circuit including a 180-degree phase shifting circuit for shifting a phase of an input signal by an odd multiple of 180 degrees, and a 360-degree phase shifting circuit for shifting a phase of the input signal by an integral multiple of 360 degrees. The signal output circuit also includes an operational amplifier having first through third input terminals and an output terminal, the first and second input terminals having a same polarity, and the third input terminal having a different polarity than the first and second input terminals. The input signal is input to the first input terminal, where a 360-degree shifted signal output from the 360-degree phase shifting circuit is input to the second input terminal, and where a 180-degree shifted signal output from the 180-degree phase shifting circuit is input to the third input terminal. A difference of a sum of the input signal and the 360-degree shifted signal from the 180-degree shifted signal is output from the output terminal.

Independent claim 33 recites a signal output method including outputting a 180-degree shifted signal from a 180-degree phase shifting circuit, the 180-degree shifted signal being phase-shifted from an input signal by an odd multiple of 180 degrees, and outputting a 360-degree shifted signal from a 360-degree phase shifting circuit, the 360-degree shifted signal being phase-shifted from the input signal by an integral multiple of 360 degrees. The method also includes inputting the input signal to a first input terminal of an operational amplifier, and inputting the 360-degree shifted signal to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity. The method further includes inputting the 180-degree shifted signal to a third input terminal of the operational amplifier, the third input having a different polarity than the first and second input terminals, and outputting a difference of a sum of the input signal and the 360-degree shifted signal from the 180-degree shifted signal, from an output terminal of the operational amplifier.

The applied art is not seen to disclose, teach, or to suggest the foregoing features recited by independent claims 29 and 33. In particular, Lampel is not seen to disclose at least the features that *vii)* the input signal is input to a first input terminal of an operational amplifier, and the 360-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity, *iix)* the 180-degree shifted signal is input to a third input terminal of the operational amplifier, the third input having a different polarity than the first and second input terminals, and *ix)* a difference of a sum of the input signal and the 360-degree shifted signal from the 180-degree shifted signal is output from an output terminal of the operational amplifier.

To its advantage, present disclosure provides that the signal-to-noise ratio of an input signal can be improved by a factor of at least $\sqrt{2}$ by applying a 180-degree shifted signal and/or a 360-degree shifted signal to the input signal. When the input signal is a wobble signal, the signal-to-noise ratio improvement effectuates a more precise control of the rotation of an optical disk.

Lampel is seen to disclose an automatic sweep acquisition circuit for phase-locked-loops ("PLLs") that includes an operational amplifier 101, an input impedance 103, a feedback impedance 104, and a sweep circuit 109. *See* Lampel, col. 3, ll. 3 to 13 and 40 to 54; and Abstract. The sweep circuit 109 is seen to provide a non-inverting input 130 with a positive feedback signal that is substantially 180 degrees out-of-phase with inverting input 125 of the operational amplifier 101. *See* Lampel, col. 4, ll. 54 to 66.

In contrast to Lampel, the present disclosure provides that a 180-degree shifted signal and/or a 360-degree shifted signal are based upon an input signal, not upon feedback from an output terminal of an operational amplifier. While the positive feedback signal described by Lampel is a signal which is seen to be fed back to the inverting input 130 of the operational amplifier 101 from a node 105 of the operational amplifier 101 via the sweep circuit 109, the signal is seen to be based upon feedback from the operational amplifier 101. *See* Lampel, Figure 1. Accordingly, the sweep circuit 109 of Lampel is seen to be interposed in a feedback loop of the operational amplifier 101.

As such, Lampel, either alone or in combination with Kuroda, Konishi, and/or Wang, assuming *arguendo* that such a combination is possible, is not seen to disclose at least the features that *i)* the input signal is input to a first input terminal of an operational amplifier, *ii)* the 180-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a different polarity, *iii)* a difference between the input signal and the 180-degree shifted signal is output from an output terminal of the operational amplifier, *iv)* the input signal is input to a first input terminal of an operational amplifier, *v)* the 360-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity, and *vi)* a sum of the input signal and the 360-degree shifted signal is output from an output terminal of the operational amplifier, *vii)* the input signal is input to a first input terminal of an operational amplifier, and the 360-degree shifted signal is input to a second input terminal of the operational amplifier, the first and second input terminals having a same polarity, *iix)* the 180-degree shifted signal is input to a third input terminal of the operational amplifier, the third input having a different polarity than the first and second input terminals, and *ix)* a difference of a sum of the input signal and the 360-degree shifted signal from the 180-degree shifted signal is output from an output terminal of the operational amplifier.

Accordingly, based on the foregoing remarks, independent claims 17, 26, 29, and 31 to 33 are believed to be allowable over the applied references. The other rejected claims in the application are each dependent on these independent claims and are believed to be allowable for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, individual consideration of each on its own merits is respectfully requested.

No other matters being raised, it is believed that the entire application is fully in condition for allowance and such action is courteously solicited.

No fees are believed to be due at this time. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

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Gregory A. Walters
Reg. No. 41,366

PTO Customer No.: 26171
Fish & Richardson P.C.
1425 K Street, NW
11th Floor
Washington, DC 20005
Telephone: (202) 783-5070
Facsimile: (202) 783-2331

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